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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/553,847

10/20/2005

Ikutomo Umeoka

2005_1497A

6289

52349 7590 06/24/2008
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EXAMINER

KASTURE, DNYANESH G

ART UNIT

PAPER NUMBER

3746

MAIL DATE

DELIVERY MODE

06/24/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/553,847	Applicant(s) UMEOKA ET AL.	
	Examiner DNYANESH KASTURE	Art Unit 3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 October 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>20 Oct 05, 28 Nov 05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: Page 6: "excluding a region with a predetermined width" is ambiguous. Since the region has varying width, what is the width being excluded ?

Appropriate correction is required. Applicant is further advised to review the specification and check if proper Idiomatic English is being used.

Claim Objections

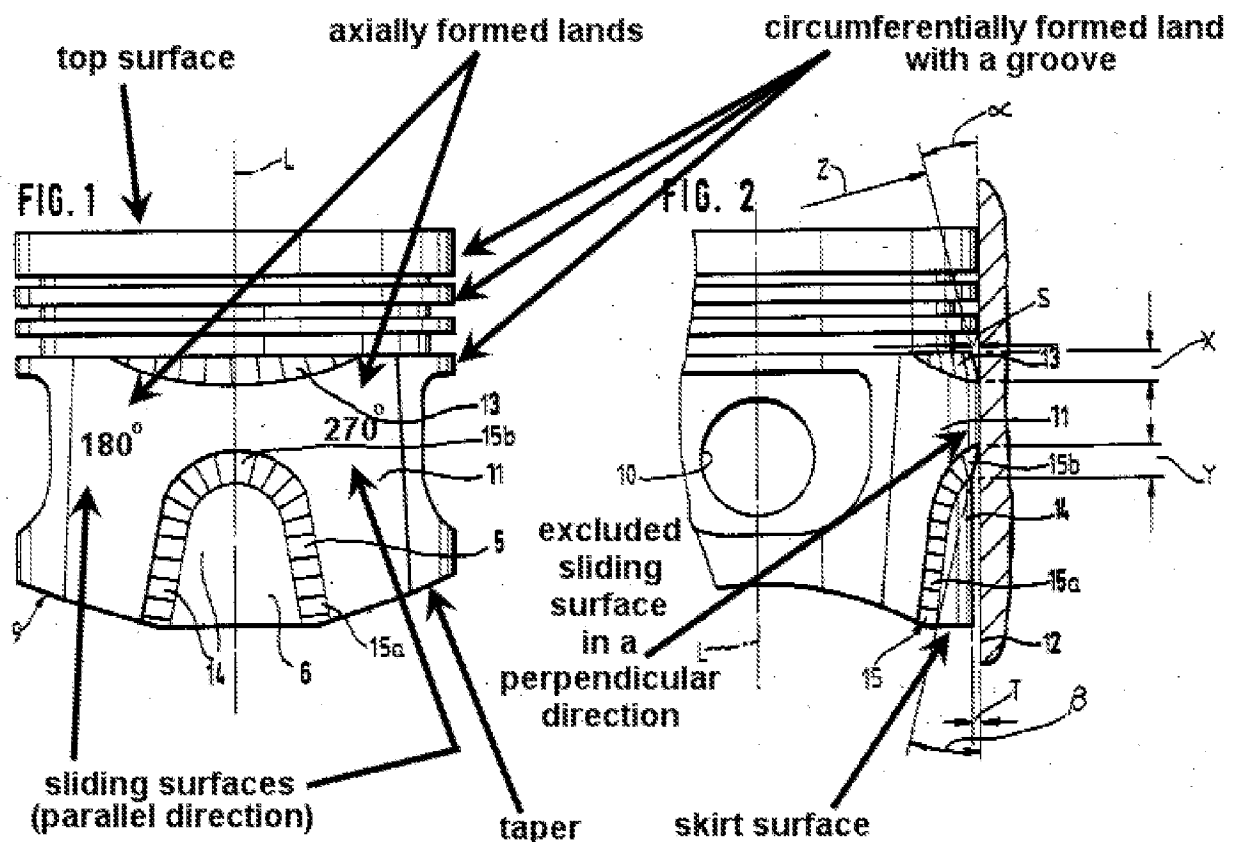
2. Claim 1 is objected to because of the following informalities: the expression "...the under cut separated from a top surface at a cylinder side of the piston..." is ambiguous as the reference to the top surface is not clearly stated. It is assumed that the top surface of the piston is being referred to.

3. Claim 5 is objected to because it is not clear how a predetermined width can be "from" a top surface. It is assumed that the width is being measured with the top surface as a reference, marking off a predetermined width towards the skirt surface.

4. Claim 9 is objected to because it has the phrase "undercut that is recess with" which is not in proper grammatical form, the phrase "undercut that is recessed with" is suggested instead. In addition, the phrase "..an outer circumferential surfaces.." is improper plural, the phrase "..an outer circumferential surface.." is suggested instead.

5. Claim 11 is objected to because it is not clear what "discontinuous" means, is there a circumferential surface all around between the under cut and skirt ?

6. Appropriate corrections are required.



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9. In Re claim 1, Kojima discloses a hermetic compressor (abstract) comprising a housing (1) which contains oil and houses a compression mechanism (6) for compressing a refrigerant gas, the compression mechanism comprising:

- a crankshaft (10) disposed in a vertical direction and having a main shaft (11) and an eccentric shaft (12)
- a block (16) forming a cylinder (17)
- a piston (20) reciprocating in the cylinder (17) in a direction of a cylinder axis
- a piston pin (22, 122) disposed on the piston (20) in a way in which a center axis is in parallel to the eccentric shaft (12)
- a connecting rod (21) for connecting the eccentric shaft (12) to the piston pin
- an oil supplying structure (14) for supplying oil to an outer circumferential surface of the piston (20)
- part of the skirt side of the piston (20) is protruded to the outside of cylinder (16, 17) in the vicinity of the bottom dead center position as depicted in Figure 5

10. However, Kojima does not disclose an undercut configured in a manner set forth in the claim.

11. Nevertheless, with reference to Figures 1 and 2 depicted above, Ellermann et al discloses a piston (abstract) with an under cut (14) on the outer circumferential surface (11) excluding a sliding surface (depicted) existing in a parallel direction and in a perpendicular direction of the piston pin viewed from an axial direction of the piston as depicted (see relative orientation of the hole (10)), The under cut is separated from the top surface (separation depicted by the double sided arrow between "X" and "Y"), and

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communicated with a space inside the housing because it is situated at the bottom of the piston.

12. It would have been obvious to a person having ordinary skill in the art at the time of the invention to use the piston of Ellermann et al instead of the piston in the compressor of Kojima as an alternate design choice for a piston that reduces the friction between the piston skirt and cylinder liner as stated by Ellermann et al in Column 1, Lines 63-64.

13. In Re claim 2, Ellermann et al depicts that under cut occupies a substantially large area of the circumferential surface, however it does not specifically say that the undercut is no less than half the area. Nevertheless it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art - MPEP 2144.05 (II-B). Kojima modified by Ellermann et al as applied to claim 1 discloses all the claimed limitations.

14. In Re claim 3, Ellermann et al depicts an angle β that is acute as depicted which is substantially maintained around the edges of the undercut ending in the skirt surface.

15. In Re claim 4, Ellermann et al depicts the undercut surface (6) is formed continuously to a skirt surface.

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16. In Re claim 5, Ellermann et al depicts the piston having a circumferentially formed land over a predetermined width marked off from the top surface towards the skirt surface, The groove in the circumferentially formed land is also depicted.

17. In Re claim 6, Ellermann et al depicts a taper in the boundary between the skirt surface and the outer circumferential surface.

18. In Re claim 9, Kojima discloses a hermetic compressor (abstract) comprising a housing (1) which contains oil and houses a compression mechanism (6) for compressing a refrigerant gas, the compression mechanism comprising:

- a crankshaft (10) disposed in a vertical direction and having a main shaft (11) and an eccentric shaft (12)
- a block (16) forming a cylinder (17)
- a cylindrical piston (20) reciprocating in the cylinder (17) in a direction of a cylinder axis
- a piston pin (22, 122) disposed on the piston (20) in a way in which a center axis is in parallel to the eccentric shaft (12)
- a connecting rod (21) for connecting the eccentric shaft (12) to the piston pin, the piston pin and the connecting rod forming the connecting portion
- part of the skirt side of the piston (20) is protruded to the outside of cylinder (16, 17) in the vicinity of the bottom dead center position as depicted in Figure 5

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19. However, Kojima does not disclose under cuts and the land surfaces formed as a result with configuration and form as set forth in the claim.

20. Nevertheless, with reference to Figures 1 and 2 depicted above, Ellermann et al discloses a cylindrical piston with a skirt surface at the side of the connecting portion (10), a top surface as depicted and:

- an outer circumferential surface (11) parallel to the cylinder
- the outer circumferential surface having an under cut (14) and lands (where there is no under cut), where:
 - the undercut is recessed with reference to the outer circumferential surface and the lands are on the same surface as the outer circumferential surface, the lands comprising:
 - a circumferentially formed land as depicted over a predetermined width marked off from the top surface towards the skirt surface
 - an axially formed land formed in a predetermined width on an outer circumferential surface at 0 deg, 90 deg, 180 deg and 270 deg with respect to the cylinder axis as a center as depicted (note that only the 180 deg and 270 deg positions are shown, the 0 deg and 90 deg positions are symmetrically on the other side of the piston), the lands are continuously formed with no breaks (as depicted) from the circumferentially formed land to the skirt surface

21. It would have been obvious to a person having ordinary skill in the art at the time of the invention to use the piston of Ellermann et al instead of the piston in the compressor of Kojima as an alternate design choice for a piston that reduces the friction

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between the piston skirt and cylinder liner as stated by Ellermann et al in Column 1, Lines 63-64.

22. In Re claim 10, Ellermann et al depicts the undercut surface (6) is formed continuously to a skirt surface.

23. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima Takeshi (Japanese Patent Publication number JP 2004027969) in view of Ellermann et al (US Patent 4,599,935 A) and further in view of Helt (US Patent 6,282,910 B1).

24. In Re claim 7, Kojima modified by Ellermann et al as applied to claim 1 discloses all the claimed limitations except for the motor element driven by an inverter at plural operating frequencies including an operation frequency that is at least power supply frequency or less.

25. Nevertheless Helt discloses how power at a nominal frequency from a power supply is input to an inverter which converts that power to a reduced frequency at its output which is conveyed to a motor which runs at a reduced speed - Column 5, Lines 59-65: "Power at a nominal frequency from supply 27 is applied to inputs 63 and 64 of inverter 50. Inverter 50 then converts that power to create an output of a lower than nominal frequency at inverter outputs 65 and 66, which closed contacts 56 now conveys to motor input 62. The lower frequency causes blower motor 48 to run at a reduced blower speed ..".

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26. It would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate the inverter and reduced frequency motor operation methodology of Helt into the motor of Kojima modified by Ellermann et al as a suitable design choice for the motor apparatus and mode of operation for the purpose of providing lower flow rates when appropriate, as stated in by Helt in Column 5, line 65.

27. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima Takeshi (Japanese Patent Publication number JP 2004027969) in view of Ellermann et al (US Patent 4,599,935 A) and further in view of Numoto et al (US Patent 6,082,132 A).

28. In Re claim 8, Kojima modified by Ellermann et al as applied to claim 1 discloses all the claimed limitations except for the usage of R 600 a refrigerant gas.

29. However, Numoto et al discloses in Column 1 line 7 that R600a refrigerant is used in a refrigeration cycle.

30. It would have been obvious to a person having ordinary skill in the art at the time of the invention to use R 600 a refrigerant of Numoto et al in the compressor of Kojima modified by Ellermann et al as a suitable design choice for a compressible medium that does not contribute to global warming and preserves the ozone layer as mentioned in Column 1, Lines15-25 of Numoto et al.

31. As best understood, Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima Takeshi (Japanese Patent Publication number JP 2004027969) in view of Ellermann et al (US Patent 4,599,935 A) and further in view of Klotz et al (US Patent 5,860,395 A)

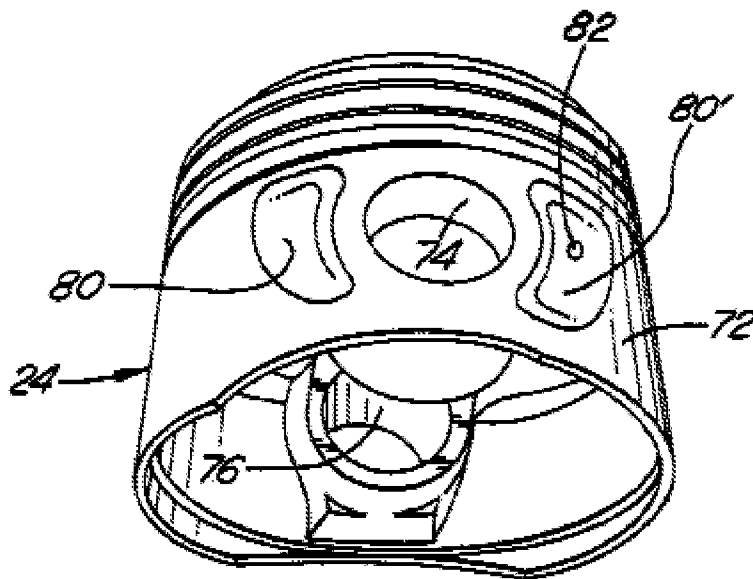


FIG. 6

32. In Re claim 11, Kojima modified by Ellermann et al as applied to claim 1 discloses all the claimed limitations except for the under cut being formed discontinuously to the skirt surface.

33. However, with reference to Figure 6 depicted above, Klotz et al discloses an under cut being formed with a recess (80') that does not extend all the way to the skirt surface.

34. It would have been obvious to a person having ordinary skill in the art at the time of the invention to incorporate the discontinuous under cut made in the piston of Klotz et

al into the piston of Kojima modified by Ellermann et al as an alternate design choice for the undercut for the purpose of retaining the lubricating oil between the piston and cylinder.

Conclusion

35. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Drevitson (US Patent 1,760,122 A) discloses an alternate configuration of recesses in the circumferential surface of a piston.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DNYANESH KASTURE whose telephone number is (571)270-3928. The examiner can normally be reached on Mon-Fri, 9:00 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272 - 7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746

DGK